



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

### About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

CANADA - Internal Revenue Dept  
Report.

1889 part 2

**LITTAUER LIBRARY**  
**HARVARD UNIVERSITY**  
**APR 19 1960**





REPORT, RETURNS AND STATISTICS  
OF THE  
INLAND REVENUES  
OF THE  
DOMINION OF CANADA

FISCAL YEAR ENDED 30th JUNE  
1889,

PART II

INSPECTION OF WEIGHTS AND MEASURES AND GAS

*Presented to both Houses of Parliament by Command of His Excellency,*

JOHN COSTIGAN,  
*Minister of Finance and Revenue.*

PRINTED BY ORDER OF PARLIAMENT.



OTTAWA  
PRINTED BY BROWN CHAMBERLIN, PRINTER TO THE QUEEN'S MOST  
EXCELLENT MAJESTY.

1890.

Digitized by Google



REPORT, RETURNS AND STATISTICS

OF THE

*part of*  
INLAND REVENUES

OF THE

DOMINION OF CANADA—

FOR THE

FISCAL YEAR ENDED 30th JUNE

1889.

---

PART II

INSPECTION OF WEIGHTS AND MEASURES AND GAS

---

*Presented to both Houses of Parliament by Command of His Excellency.*

JOHN COSTIGAN,  
*Minister of Inland Revenue.*

---

PRINTED BY ORDER OF PARLIAMENT.

---



OTTAWA :

PRINTED BY BROWN CHAMBERLIN, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY.

1890.



APR 7 18

Hen. J. H. Bourne



REPORT  
OF THE  
COMMISSIONER OF INLAND REVENUE  
ON THE  
INSPECTION OF WEIGHTS AND MEASURES, AND GAS.

---

To the Honorable  
The Minister of Inland Revenue.

SIR,—I have the honor to submit herewith my report on the inspection of Weights and Measures and Gas, with the usual statements in relation thereto, for the year ended 30th June, 1889.

1. The total revenue collected during the year for the inspection of Weights and Measures was thirty six thousand and forty dollars and ninety-one cents (\$36-040.91,) as against thirty seven thousand eight hundred and eighty-five dollars and thirty-nine cents (\$37,885.39) collected during the year ended 30th June, 1888.

The total expenditure was sixty-seven thousand three hundred and ten dollars and fourteen cents (\$67,310.14) as against sixty-seven thousand four hundred and seventy dollars and sixty-eight cents (\$67,470.68) expended during the year ended 30th June, 1888.

2. Appendix "A" gives a summary statement of the expenditure and receipts of each inspection division.

Hamilton is the only division in which the receipts exceed the cost of collection.

3. In Appendices "B", "C" and "D" will be found a detailed statement of weights and measures and weighing machines presented for verification, verified, and rejected during the year.

The number of all descriptions may be summarily stated as follows :—

—	Presented.	Verified.	Rejected.	Percentage of Rejections.
Weights, Dominion .....	83,161	82,781	380	0·45
Measures of Capacity, Dominion. ....	85,805	85,405	400	0·46
Lineal Measures .....	4,274	4,101	173	4·04
Balances, equal arms .....	13,001	12,820	181	1·39
do Steelyards .....	5,485	5,442	43	0·78
do Platform Scales .....	22,612	22,341	271	1·19
Irregular Weights .....	4,334	4,246	88	2·03
do Measures .....	318	318	.....	.....
Troy Weights .....	37	35	2	5·40

4. In order to comply with the requirements of Sec. 34 of the Weights and Measures Act, relative to the comparison of the Departmental with the Parliamentary copies of the Dominion standards of weight and length, I had the comparisons scientifically made by W. J. London Esq., Lecturer in Physics, University College, Toronto, whose report in full will be found in Appendix "H."

5. Since the date of my last report, Mr. Johnstone, Chief Inspector Standards Branch, has visited and inspected the offices, books, standards &c., of the divisions of Montreal, Ottawa, Toronto, Orillia, Hamilton, London, Windsor, Manitoba and British Columbia, taking in *en route* Brandon, Qu'Appelle and Calgary ; he also carefully adjusted, verified and stamped the whole of the 50 lbs iron standards of weight in use in the above named divisions and offices. Mr. Johnstone reports having found the work progressing fairly well, and the public generally satisfied with the manner in which the Weights and Measures Act is now being administered.

6. I again take the liberty to call your attention to and urge upon you the necessity of immediately securing the services of a first class practical scale maker to attend to the repairing and adjusting of the "local" standards &c. It is really next thing to an impossibility, to keep this branch of the service in anything like proper condition without the mechanical assistance suggested.

#### INSPECTION OF GAS.

7. The total revenue collected during the year for the inspection of gas and gas meters was seven thousand nine hundred and twenty-two dollars and seventy-five cents (\$7,922.75) as compared with six thousand nine hundred and forty-six dollars and sixty-five cents, (\$6,946.65) collected during the year 1887-88.

The total expenses were eighteen thousand five hundred and thirty-eight dollars and ninety-six cents, (\$18,538.96) as against twenty thousand eight hundred and ninety-four dollars and ninety-eight cents, (\$20,894.98) during the year ended 30th June, 1888.

8. Appendix "E" gives a summary statement of the expenditure and receipts of each gas Inspection District.

9. The details of gas meters will be found in Appendix "F". The result, as compared with the previous year, may be stated as follows :—

	Presented for verification.	Finally rejected.
1887-88.....	7,945	158
1888-89.....	9,629	198

### *Illuminating Power.*

10. A statement of the illuminating power and purity of gas inspected during the year will be found in Appendix "G."

The illuminating power, where inspection has been made, has been as follows :—

Places.	Number of tests made.	Number of times below standard.	Places.	Number of tests made.	Number of times below standard.
Belleville.....	36	1	St. Thomas.....	12	0
Brockville.....	16	0	Toronto.....	104	0
Brantford.....	12	0	Windsor.....	12	0
Chatham.....	12	0	Woodstock.....	12	0
Cobourg.....	11	0	Montreal.....	108	0
Cornwall.....	12	5	Quebec.....	12	0
Dundas.....	12	0	Sherbrooke.....	12	0
Guelph.....	12	0	Three Rivers.....	52	1
Hamilton.....	12	0	Chatham, N.B.....	0	0
Ingersoll.....	12	0	Fredericton.....	11	0
Kingston.....	46	0	St. John.....	90	0
Lindsay.....	12	0	Moncton.....	0	0
London.....	36	0	Halifax.....	24	0
Napanee.....	0	0	Pictou.....	12	0
Ottawa.....	36	19	Yarmouth.....	12	2
Peterborough.....	12	0	Charlottetown.....	37	0
Port Hope.....	11	0	Winnipeg.....	12	0
Stratford.....	11	0	Victoria, B.C.....	28	0
St. Catharines.....	12	0			

From the preceding table it will be seen that a very great improvement has been made in the illuminating power of the gas supplied to consumers during the year covered by this report, Ottawa and Cornwall being the only two places whose record is greatly deficient.

### *Tests for purity.*

11. Gas has only been tested regularly for sulphur and ammonia at Ottawa, Toronto, Montreal, Quebec, St. John and Halifax.

12. In Ottawa the total number of tests made was :—

For sulphur, 25 tests, once in excess of standard.

For ammonia, 25 tests, never in excess.

For sulphuretted hydrogen, 36 tests, never in excess.

## 13. In Toronto :—

For sulphur, 24 tests, none below.

For ammonia, 24 tests, none below.

For sulphuretted hydrogen, 104 tests, once present.

## 14. In Montreal :—

For sulphur, 49 tests, 22 times in excess.

For ammonia, 49 tests, never in excess.

For sulphuretted hydrogen, 108 tests, never present.

## 15. In Quebec :—

For sulphur, 24 tests, never in excess.

For ammonia, 24 tests, never in excess.

For sulphuretted hydrogen, 24 tests, never present.

## 16. In St. John N. B. :—

For sulphur, 49 tests, never in excess.

For ammonia, 49 tests do

For sulphuretted hydrogen, 90 tests, never present.

## 17. In Halifax :—

For sulphur, 24 tests, never in excess.

For ammonia, 24 tests do

For sulphuretted hydrogen, 24 tests, never present.

18. In addition to the foregoing, tests for sulphuretted hydrogen have been made at each of the following places, where illuminating power has been tested, with the following results :—

Places.	Number of tests.	Present.	Places.	Number of tests.	Present.
Bellefille.....	36	2	Stratford .....	12	1
Brantford .....	12	0	Stratford, 2nd .....	7	3
Brockville .....	16	0	St. Thomas.....	12	0
Chatham .....	12	0	St. Catharines.....	12	0
Cobourg.....	11	0	Windsor .....	12	0
Cornwall .....	12	2	Woodstock .....	12	0
Dundas .....	12	1	Sherbrooke .....	12	0
Guelph.....	12	0	Three Rivers.....	52	0
Hamilton.....	12	0	Chatham, N. B.....	0	0
Ingersoll .....	12	0	Fredericton.....	11	3
Kingston.....	46	0	Moncton .....	0	0
Lindsay.....	12	0	Pictou .....	12	0
London.....	36	0	Yarmouth .....	12	0
Napanee.....	36	0	Charlottetown.....	37	0
Peterborough.....	12	1	Winnipeg .....	12	0
Port Hope .....	11	0	Victoria .....	28	0

## REPORT OF PROGRESS.

19. Since the date of my last report, gas inspection offices have been fitted up and the inspection of gas and gas meters regularly established at Galt, Listowell and

Owen Sound. The gas inspection office at Stratford has been removed and conveniently fitted up in the basement of the Government building there. Three of the four American meter provers purchased by the Department, between two and three years ago, which were found not to comply with our Gas Inspection Act as regards the required 3 inch pressure, have been altered and re-graded so as to meet the requirements of the Act,—they are now in the offices at Toronto, Hamilton and London. The English meter provers at those places, which were replaced by the American, were sent to Hamilton, where they were re-lined with rolled copper, and thus made more durable and better in every way than they were when new. They are now set up and in use in the Galt, Listowell and Owen Sound offices.

Four “Aubin” Photometers were sent to Hamilton—three from Montreal and one from the Department. After overhauling, &c., three of these photometers were set up in the Galt, Listowell and Owen Sound offices. The fourth is now at Hamilton ready for shipment to any point where it may be required.

During the present year, the Department has had made by Messrs Wallace & Son, of Hamilton, four meter provers and four photometers.

The meter provers are, as regards material, workmanship and style of finish, far superior to anything of the kind hitherto furnished the Government by either English or American makers, and at considerably less cost.

As several important improvements, suggested by Mr. Inspector McPhie, have been adopted by the makers, the photometers made by Messrs. Wallace & Son are, in many respects, much superior to the original sample.

It will be seen by the foregoing that the Department has on hand at present four full sets of gas inspection apparatus, and one spare photometer. Gas inspection is asked for at Berlin, Sarnia, Barrie, Napanee and Deseronto.

The fitting up of new gas inspection offices at Galt, Listowell and Owen Sound, and the removal and re-fitting of the Stratford office; the altering and re-grading of the American meter provers, the re-lining and repairing of the English holders, the overhauling and repairing of the four Aubin photometers, with various improvements, were all done under the immediate supervision of Mr. McPhie, Gas Inspector, Hamilton, to whom much credit is due for his valuable and painstaking services.

Respectfully submitted.

EDWARD MIALL.

*Commissioner.*

# APPENDIX A.

## STATEMENT of Expenditure and Receipts for Year ended 30th June, 1889.

Inspection Divisions.	Inspectors and Assistant Inspectors.	EXPENDITURE.						Receipts.
		Salaries.	Seizure Expenses.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Total.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
<i>Province of Ontario.</i>								
Belleville.....	Wm. Johnson..... Thos. Slattery..... Samuel Irwin.....	2,300 00	105 76	.....	37 50	489 19	237 19	3,169 64
Hamilton.....	T. H. McKenzie..... John McDonald..... W. G. McDonnell..... Thos. Beattie..... C. E. S. Black..... A. Marentette..... Robt. Magness..... J. D. Park.....	5,028 99	.....	.....	.....	425 46	491 38	5,945 83
Kingston.....	J. A. Macdonald..... W. W. Giffin..... Wm. Whiteaker.....	2,200 00	.....	.....	90 00	614 94	307 23	3,212 17
London.....	Jas. Egan..... D. Coughlin..... Jos. S. Thomas.....	2,400 00	.....	.....	.....	467 72	106 34	2,974 06
Orillia.....	G. J. Bolster..... John Lyons.....	1,700 00	.....	.....	.....	481 75	52 50	2,234 25
Ottawa.....	A. Code..... M. Gorman..... John Cosgrove..... Pat. Lynch.....	2,900 00	.....	.....	250 00	779 97	145 68	4,075 65
								1,676 39
								1,798 49
								1,909 24
								1,644 62

Toronto.....	Harry Piper..... R. J. Wright..... D. Kinnee..... R. Milligan.....	3,300 00	.....	.....	.....	.....	486 27	94 36	3,880 63	2,544 12
Windsor.....	W. J. Hayward..... R. A. Hughes..... District Inspector.....	1,443 55	80 68	.....	.....	.....	1,029 10 17 85	94 68	2,648 01 17 85	2,453 23
		21,272 54	186 44	.....	377 50	.....	4,792 25	1,529 36	28,158 09	22,812 85
<i>Province of Quebec.</i>										
Montreal.....	J. O. Chalut..... J. R. Urquhart..... J. T. Dorian..... S. Dillon..... J. A. Daoust..... F. L. Desrivieres.....	4,850 00	10 60	.....	.....	.....	543 53	286 73	5,640 86	5,219 64
Quebec.....	B. E. Bourassa..... W. Adams..... H. Simard..... J. B. Petit..... F. X. Chabot..... M. J. Kelly.....	3,600 00	.....	.....	42 00	.....	586 53	225 02	4,453 55	1,950 85
Sherbrooke.....	E. Clark..... Jos. S. Baker..... J. N. Richard.....	2,200 00	.....	.....	.....	.....	416 29	111 43	2,727 72	778 83
Three Rivers.....	J. A. Olivier..... J. J. Provost..... P. C. A. Bruneau.....	2,241 66	.....	.....	20 00	.....	300 60	29 47	2,591 73	1,072 96
		12,891 66	10 60	.....	62 00	.....	1,846 95	602 65	15,413 86	9,022 28



APPENDIX A—Continued.  
STATEMENT of Expenditure and Receipts for Year ended 30th June, 1889—Continued.

Inspection Divisions.	Inspectors and Assistant Inspectors.	EXPENDITURE.							Receipts.
		Salaries.	Seizure Expenses.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Total.	
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
<i>Province of New Brunswick.</i>									
Fredericton.....	E. C. Freeze Geo. Bois.....	1,600 00				195 08	23 23	1,818 31	238 25
King's.....	W. B. Scovil. David Richard.....	1,300 00				273 82	19 36	1,593 18	433 19
St. John.....	J. B. Wilnot. E. Cowan.....	1,800 00				1 78	12 97	1,814 75	542 71
		4,700 00				470 68	55 56	5,226 24	1,214 15
<i>Province of Nova Scotia.</i>									
Cape Breton....	L. E. Tremaine.....	800 00			70 00	9 00	62 69	941 69	73 35
Halifax.....	J. B. Ryan Edward Kelly.....	1,291 62			222 50	18 60	83 70	1,616 42	369 02
Pictou.....	J. McKay.....	900 00				116 61	40 65	1,057 26	352 68
Yarmouth.....	Chas. Allison.....	1,000 00				253 29	16 82	1,270 11	233 07
	District Inspector.....					18 70	4 77	23 47	
		3,991 62			292 50	416 20	208 63	4,908 95	1,080 12

Province of Prince Edward Island.										
Charlottetown.....	Jas. Reddin .....	1,000 00	.....	.....	.....	144 10	61 01	1,205 11	292 31	
Province of Manitoba.										
Winnipeg .....	R. T. Haggard..... W. Cowley..... J. W. Costello .....	3,500 00	.....	.....	.....	108 00	549 43	84 05	4,241 48	1,377 33
	H. E. Ross..... R. J. M. Girdlestone..... A. C. Patterson.....									
Province of British Columbia.										
Victoria .....	Richard Jones.....	950 00	.....	.....	.....	210 00	302 78	98 25	1,561 03	291 87
RECAPITULATION.										
Ontario.....	21,272 54	186 44	.....	.....	.....	377 50	4,792 25	1,529 36	28,158 09	22,812 85
Quebec .....	12,891 66	10 60	.....	.....	.....	62 00	1,846 96	602 65	16,413 86	9,022 28
New Brunswick.....	4,700 00	.....	.....	.....	.....	.....	470 68	55 56	5,226 24	1,214 15
Nova Scotia.....	3,991 62	.....	.....	.....	.....	292 50	416 20	208 63	4,908 95	1,030 12
Prince Edward Island.....	1,000 00	.....	.....	.....	.....	.....	144 10	61 01	1,205 11	292 31
Manitoba.....	3,500 00	.....	.....	.....	.....	108 00	549 43	84 05	4,241 48	1,377 33
British Columbia .....	950 00	.....	.....	.....	.....	210 00	302 78	98 25	1,561 03	291 87
General Contingencies.....	2,800 00	.....	.....	.....	.....	.....	655 73	1,953 09	5,408 82	.....
Queen's Printer.....	.....	.....	.....	.....	.....	.....	.....	748 97	748 97	.....
Stationery Office.....	.....	.....	.....	.....	.....	.....	.....	437 59	437 59	.....
Grand Total.....	51,105 82	197 04	.....	.....	.....	1,050 00	9,178 12	5,779 16	67,310 14	36,040 91

## APPENDIX

RETURN of the Weights and Measures Inspected during the Fiscal Year  
tion, Verified and Rejected, for each Division, for

NAME OF INSPECTION OFFICE.	WEIGHTS.								
	Dominion.			Irregular.			Troy.		
	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.
<i>Ontario.</i>									
Belleville.....	2,061	2,061	....	197	197	....	....	....	....
Hamilton.....	20,004	20,004	....	163	163	....	....	....	....
Kingston.....	2,504	2,364	140	250	193	57	....	....	....
London.....	1,257	1,257	....	88	88	....	....	....	....
Orillia.....	1,823	1,823	....	118	118	....	....	....	....
Ottawa.....	3,416	3,412	4	271	271	....	....	....	....
Toronto.....	6,330	6,330	....	....	....	....	12	10	2
Windsor.....	4,328	4,324	4	306	304	2	....	....	....
	41,723	41,575	148	1,393	1,334	59	12	10	2
<i>Quebec.</i>									
Montreal.....	15,689	15,577	112	694	680	14	9	9	....
Quebec.....	9,302	9,259	43	1,035	1,028	7	....	....	....
Sherbrooke.....	1,189	1,187	2	128	128	....	....	....	....
Three Rivers.....	4,167	4,163	4	383	382	1	....	....	....
	30,347	30,186	161	2,240	2,218	22	9	9	....
<i>New Brunswick.</i>									
Fredericton.....	453	453	....	62	62	....	....	....	....
Kings.....	913	913	....	104	104	....	....	....	....
St. John.....	1,359	1,359	....	172	172	....	....	....	....
	2,725	2,725	....	338	338	....	....	....	....
<i>Nova Scotia.</i>									
Cape Breton.....	90	90	....	7	7	....	....	....	....
Halifax.....	1,205	1,205	....	125	125	....	....	....	....
Pictou.....	511	485	26	58	51	7	....	....	....
Yarmouth.....	618	618	....	151	151	....	....	....	....
	2,424	2,398	26	341	334	7	....	....	....
<i>Prince Edward Island.</i>									
Charlottetown.....	540	540	....	15	15	....	....	....	....
<i>Manitoba.</i>									
Winnipeg.....	5,050	5,005	45	....	....	....	....	....	....
<i>British Columbia.</i>									
Victoria.....	352	352	....	7	7	....	16	16	....

## B.

ended 30th June, 1889, showing the Total Number brought for Verification each Province, and for the whole Dominion.

DOMINION MEASURES OF CAPACITY.					MEASURES OF LENGTH.			BALANCES, &c.								
								Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.		
Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.
1,633	1,683	...	1	1	36	36	...	335	335	...	92	92	...	734	733	1
4,634	4,629	5	10	10	52	51	1	4,061	4,048	13	3,874	3,872	2	7,485	7,464	21
10,587	10,273	314	199	199	202	128	74	403	358	45	47	35	12	1,100	1,023	77
10,664	10,663	1	...	...	80	80	...	227	226	1	63	62	1	778	758	20
1,626	1,626	...	...	...	362	313	49	334	334	...	109	109	...	874	872	2
3,140	3,134	6	2	2	295	295	...	489	488	1	1	1	...	1,258	1,258	...
11,252	11,252	...	52	52	213	213	...	973	973	...	490	490	...	1,388	1,388	...
2,842	2,840	2	...	...	380	379	1	788	788	...	114	114	...	1,751	1,729	22
46,428	46,100	328	264	264	1,620	1,495	125	7,610	7,550	60	4,790	4,775	15	15,368	15,225	143
18,454	18,454	...	18	18	1,303	1,303	...	2,154	2,118	36	427	412	15	2,768	2,731	37
5,605	5,603	2	...	...	709	681	28	1,220	1,204	16	38	35	3	543	535	8
1,660	1,626	34	...	...	149	144	5	186	179	7	21	21	...	446	421	25
3,959	3,931	28	...	...	206	199	7	603	574	29	17	17	...	590	576	14
29,678	29,614	64	18	18	2,367	2,327	40	4,163	4,075	88	503	485	18	4,347	4,263	84
719	719	...	...	...	...	...	...	75	75	...	5	5	...	172	172	...
942	942	...	...	...	4	4	...	154	154	...	24	24	...	340	337	3
3,319	3,317	2	1	1	18	18	...	241	240	1	21	21	...	273	273	...
4,980	4,978	2	1	1	22	22	...	470	469	1	50	50	...	785	782	3
185	185	...	...	...	16	16	...	15	15	...	...	...	...	30	30	...
1,363	1,363	...	19	19	35	35	...	155	155	...	14	13	1	254	254	...
810	806	4	4	4	41	33	8	118	96	22	11	11	...	244	233	11
733	732	1	12	12	123	123	...	114	113	1	25	25	...	170	169	1
3,091	3,086	5	35	35	215	207	8	402	379	23	50	49	1	698	686	12
297	297	...	...	...	11	11	...	95	95	...	5	5	...	237	237	...
1,209	1,208	1	...	...	39	39	...	208	202	6	45	43	2	934	905	29
122	122	...	...	...	...	...	...	53	50	3	42	35	7	243	243	...

## APPENDIX

RETURN of the Weights and Measures Inspected during the Fiscal Year  
tion, Verified and Rejected, for each Division, for

RECAPITU

NAME OF INSPECTION OFFICE.	WEIGHTS.								
	Dominion.			Irregular.			Troy.		
	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.
Ontario. ....	41,723	41,575	148	1,393	1,334	59	12	10	2
Quebec. ....	30,347	30,186	161	2,240	2,218	22	9	9	....
New Brunswick. ....	2,725	2,725	....	338	338	....	....	....	....
Nova Scotia. ....	2,424	2,398	26	341	334	7	....	....	....
Prince Edward Island. ....	540	540	....	15	15	....	....	....	....
Manitoba. ....	5,050	5,005	45	....	....	....	....	....	....
British Columbia. ....	352	352	....	7	7	....	16	16	....
Total. ....	83,161	82,781	380	4,334	4,246	88	37	35	2

**B—Concluded.**

ended 30th June, 1889, showing the Total Number brought for Verification each Province, and for the whole Dominion.

**LATION.**

DOMINION MEASURES OF CAPACITY.						MEASURES OF LENGTH.			BALANCES, &c.								
									Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.		
Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.	Brought for Verification.	Verified.	Finally Rejected.
46,428	46,100	328	264	264	1,620	1,495	125		7,610	7,550	60	4,790	4,775	15	15,368	15,225	143
29,678	29,614	64	18	18	2,367	2,327	40		4,163	4,075	88	503	485	18	4,347	4,263	84
4,980	4,978	2	1	1	22	22	...		470	469	1	50	50	...	785	782	3
3,091	3,086	5	35	35	215	207	8		402	379	23	50	49	1	698	686	12
297	297	...	...	...	11	11	...		95	95	...	5	5	...	237	237	...
1,209	1,208	1	...	...	39	39	...		208	202	6	45	43	2	934	905	29
122	122	...	...	...	...	...	...		53	50	3	42	35	7	243	243	...
85,805	85,405	400	318	318	4,274	4,101	173		13,001	12,820	181	5,485	5,442	43	22,612	22,341	271

## APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures during the Fiscal Year

DIVISION.	DOMINION									
	Avoir									
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	5 lbs.	3 lbs.	2 lbs.	1 lbs.	8 ozs.
<i>Ontario.</i>										
Belleveille.....					3	36	103	400	382	267
Hamilton.....					2	344	2,658	4,456	4,664	1,563
Kingston.....		6		2	3	85	145	389	424	367
London.....						16	100	258	208	150
Orillia.....					1	57	111	361	325	228
Ottawa.....					4	107	229	597	559	467
Toronto.....	10		1	2	32	228	625	1,045	1,018	781
Windsor.....						50	273	786	777	572
	10	6	1	4	45	903	4,244	8,292	8,357	4,395
<i>Quebec.</i>										
Montreal.....	72	89	4	10	58	971	1,189	2,214	2,172	2,134
Quebec.....		85	42	72	231	642	664	1,416	1,382	1,288
Sherbrooke.....				1	15	59	113	221	189	157
Three Rivers.....		13	3	4	19	282	323	701	663	627
	72	187	49	87	323	1,954	2,289	4,552	4,406	4,206
<i>New Brunswick.</i>										
Fredericton.....						7	8	116	85	65
King's.....						28	36	237	169	127
St. John.....						38	28	312	259	208
						73	72	665	513	400
<i>Nova Scotia.</i>										
Cape Breton.....						2	2	28	18	10
Halifax.....		8		3	3	59	36	274	224	159
Pictou.....						8	18	128	111	68
Yarmouth.....		1	1	1	2	11	17	150	113	90
		9	1	4	5	80	73	580	466	327
<i>Prince Edward Island.</i>										
Charlottetown.....						14	19	147	98	74
<i>Manitoba.</i>										
Winnipeg..					231	559	751	1,496	1,246	412
<i>British Columbia.</i>										
Victoria.....						2	14	75	56	54

## C.

of each Denomination presented for Verification in each Inspection Division ended 30th June, 1889.

WEIGHTS.								Troy Weights.	Irregular Weights.	LINEAL MEASURES.				
dupois.										Yard.	$\frac{1}{2}$ yard.	2 feet.	1 foot.	Total number Verified.
2 ozs.	1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	$\frac{1}{2}$ dr.	Total number Verified.							
241	195	121	44	9	4	4	2,061		197	36				
1,478	1,447	1,327	568	3	3		20,004		163	52				
286	251	160	55	14	6	2	2,504		250	202				
145	119	96	12	2	3	1	1,257		88	80				
195	178	104	45	12	8	4	1,823		118	362				
386	320	205	74	14	5	2	3,416		271	295				
617	544	383	247	51	55	1	6,330	12		213				
486	431	283	118	19	4	1	4,328		306	380				
3,834	3,485	2,669	1,163	124	88	15	41,723	12	1,393	1,620				
1,863	1,635	972	225	23	27	2	15,689	9	694	1,303				
1,000	803	384	131	1	1		9,302		1,035	709				
126	95	44	12	2			1,189		128	149				
444	322	160	20	1			4,167		383	206				
3,433	2,855	1,560	388	27	28	2	30,347	9	2,240	2,367				
53	42	13	2				453		62					
96	73	23	7	6	5		913		104	4				
162	137	35	8				1,359		172	18				
311	252	71	17	6	5		2,725		338	22				
8	7	4	3				90		7	16				
116	102	73	11				1,205		125	35				
50	33	22	11	2	1		511		58	39	2			
64	57	28	2				618		151	123				
238	199	127	27	2	1		2,424		341	213	2			
56	50	18	4				540		15	11				
87	75	47	25	5	4		5,050		39					
44	34	19	3				352	16	7					



## APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures during the Fiscal Year

DIVISION.	DOMINION									
	Avoir									
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	5 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.
<i>Ontario.</i>										
Belleville.....					3	36	103	400	382	267
Hamilton.....					2	344	2,658	4,456	4,664	1,563
Kingston.....		6		2	3	81	144	361	397	336
London.....						16	100	258	208	150
Orillia.....					1	37	111	361	325	228
Ottawa.....					4	107	229	596	558	466
Toronto.....	10		1	2	32	228	625	1,045	1,018	781
Windsor.....						50	273	786	777	569
<i>Quebec.</i>	10	6	1	4	45	899	4,243	8,263	8,329	4,360
Montreal.....	72	89	4	10	58	970	1,188	2,192	2,152	2,113
Quebec.....		85	42	72	231	642	661	1,405	1,373	1,281
Sherbrooke.....				1	15	59	113	221	189	156
Three Rivers.....		13	3	4	19	282	323	699	662	626
<i>New Brunswick.</i>	72	187	49	87	323	1,953	2,285	4,517	4,376	4,176
Fredericton.....						7	8	116	85	65
King's.....						28	36	237	169	127
St. John.....						38	28	312	259	208
<i>Nova Scotia.</i>						73	72	665	513	400
Cape Breton.....						2	2	28	18	10
Halifax.....		8		3	3	59	36	274	224	159
Pictou.....						8	18	119	104	64
Yarmouth.....		1	1	1	2	11	17	150	113	90
<i>Prince Edward Island.</i>		9	1	4	5	80	73	571	459	323
Charlottetown.....						14	19	147	98	74
<i>Manitoba.</i>										
Winnipeg.....					231	556	751	1,487	1,233	405
<i>British Columbia.</i>										
Victoria.....						2	14	75	56	54

C—Continued.

of each Denomination, Verified in each Inspection Division  
ended 30th June, 1889.

WEIGHTS.								Troy Weights.	Irregular Weights.	LINEAL MEASURES.				
dupois.										Yard.	$\frac{1}{2}$ yard.	2 feet.	1 foot.	Total Number Verified
2 ozs.	1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	$\frac{1}{2}$ dr.	Total Number Verified.							
241	195	121	44	9	4	4	2,061		197	36				
1,478	1,447	1,327	568	3	3		20,004		163	51				
269	240	148	55	14	6	2	2,364		193	128				
145	119	96	12	2	3	1	1,257		88	80				
195	178	104	45	12	8	4	1,823		118	313				
385	320	205	74	14	5	2	3,412		271	295				
617	544	383	247	51	55	1	6,330	10	213	213				
485	431	283	118	19	4	1	4,324		304	379				
3,815	3,474	2,667	1,163	124	88	15	41,575	10	1,334	1,495				
1,848	1,628	972	225	23	27	2	15,577	9	680	1,303				
997	800	383	131	1	1		9,259		1,028	681				
126	95	44	12	2			1,187		128	144				
444	322	160	20	1			4,163		382	199				
3,415	2,845	1,559	388	27	28	2	30,186	9	2,218	2,327				
53	42	13	2				453		62					
96	73	23	7	6	5		913		104	4				
162	137	35	8				1,359		172	18				
311	252	71	17	6	6		2,725		338	22				
8	7	4	3				90		7	16				
116	102	73	11				1,205		125	35	2			
50	33	22	10	2	1		485		51	31				
64	57	28	2				618		151	123				
238	199	127	26	2	1		2,398		334	205	2			
56	50	18	4				540		15	11				
84	71	46	24	5	4		5,005		39					
44	34	19	3				352	16	7					

## APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures  
during the Fiscal Year

DIVISION.	DOMINION										
	Avoir										
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	5 lbs.	3 lbs.	2 lbs.	1 lb.	8 oza.	4 oza.
<i>Ontario.</i>											
Hamilton .....											
Kingston .....						4	1	28	27	31	19
Orillia .....								1	1	1	
Ottawa .....											
Toronto .....											
Windsor .....										3	
<i>Quebec.</i>						4	1	29	28	35	19
Montreal .....						1	1	22	20	21	25
Quebec .....							3	11	9	7	6
Sherbrooke .....										1	1
Three Rivers .....								2	1	1	
<i>Nova Scotia.</i>						1	4	35	30	30	32
Pictou .....								9	7	4	5
<i>Manitoba.</i>											
Winnipeg .....						3		9	13	7	4

C—*Concluded.*

of each Denomination rejected in each Inspection Division.  
ended 30th June, 1889.

WEIGHTS.								Troy Weights.	Irregular Weights.	LINEAL MEASURES.				
dupois.										Yard.	$\frac{1}{2}$ Yard	2 Feet.	1 Foot.	Total Number Rejected.
2 ozs.	1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	$\frac{1}{2}$ dr.	Total Number Rejected.							
17	11	2					140		57	1				
1							4			74				
1							4	2		49				
									2	1				
19	11	2					148	2	59	125				
15	7						112		14					
3	3	1					43		7	28				
							2			5				
							4		1	7				
18	10	1					161		22	40				
			1				26		7	8				
3	4	1	1				45							

## APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances in each Inspection Division, during

Division.	MEASURES OF CAPACITY.									
	Dominion.									
	Bushel.	$\frac{1}{2}$ Bushel.	Peck.	Gallon.	$\frac{1}{2}$ Gallon.	Quart.	Pint.	$\frac{1}{2}$ Pint.	Gill.	$\frac{1}{2}$ Gill.
<i>Ontario.</i>										Total Number Presented.
Belleville .....	7	11	22	156	278	666	483	58	2	1,683
Hamilton .....	12	168	242	537	711	1,539	1,264	161	...	4,634
Kingston .....	182	1,542	1,881	2,488	1,300	1,988	1,098	97	11	10,587
London .....	1	171	143	993	1,579	3,364	3,734	679	...	10,664
Orillia .....	...	9	16	190	397	574	390	30	11	1,626
Ottawa .....	...	115	124	388	536	842	747	305	83	3,140
Toronto .....	3	36	310	1,030	2,282	3,663	3,438	488	2	11,252
Windsor .....	2	108	118	484	569	910	565	83	2	2,842
<i>Quebec.</i>	207	2,160	2,856	6,266	7,652	13,546	11,719	1,901	111	46,428
Montreal .....	...	868	944	2,942	2,800	3,354	3,636	2,420	1,488	2
Quebec .....	3	173	147	722	1,045	1,157	1,177	821	352	8
Sherbrooke .....	1	61	71	204	401	551	246	97	27	1
Three Rivers .....	...	321	174	536	831	860	629	403	149	56
<i>New Brunswick.</i>	4	1,423	1,336	4,404	5,077	5,922	5,688	3,741	2,016	67
Fredericton .....	...	32	28	162	229	151	82	31	4	719
King's .....	...	1	1	206	331	260	118	23	2	942
St. John .....	...	461	261	471	723	600	481	226	96	3,319
<i>Nova Scotia.</i>	...	494	290	839	1,283	1,011	681	280	102	4,980
Cape Breton .....	...	12	5	8	20	68	24	48	...	185
Halifax .....	3	83	55	224	200	297	308	118	65	1,963
Pictou .....	...	13	11	90	241	278	141	36	...	810
Yarmouth .....	12	25	14	138	230	187	102	24	1	733
<i>Prince Edward Island.</i>	15	133	85	460	691	830	575	226	66	3,091
Charlottetown .....	3	5	...	6	23	154	78	28	...	297
<i>Manitoba.</i>										
Winnipeg .....	57	48	2	85	195	493	302	27	...	1,209
<i>British Columbia.</i>										
Victoria .....	...	...	...	...	26	24	48	24	...	122

## D.

and Weighing Machines of each Denomination presented for Verification in the Fiscal Year ended 30th June, 1889.

Irregular Mea- sures	BALANCES.														Total Number Presented.
	With Equal Arms.				Steelyards, with Divided Arms.				Weigh-bridges, or Platform Scales.						
	Presented.	5 lbs. and under.	5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and up- wards.	500 lbs. and un- der.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	250 lbs. and un- der.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	
1	72	263			89	2	1		285	57	257	72	25	38	1,161
10	1,541	2,520			3,501	114	257	2	3,669	604	2,620	402	58	132	15,420
199	115	282	6		46	1			406	147	399	60	15	73	1,550
	67	160			62	1			233	27	390	51	8	69	1,068
	95	239			105		1	3	328	23	380	69		74	1,317
2	49	440			1				594	147	420	33	39	25	1,748
52	371	602			480	4	4	2	629	74	432	87	39	127	2,851
	285	503			113	1			760	109	616	143	21	102	2,653
264	2,595	5,009	6		4,397	123	263	7	6,904	1,188	5,514	917	205	640	27,768
18	455	1,692		7	396	4	1	26	778	679	967	121	125	98	5,349
	249	889	25	57	35	2		1	90	253	170	16	5	9	1,801
	28	158			31				155	99	150	7	22	13	653
	26	528	43	6	16	1			165	188	213	8	8	8	1,210
18	758	3,267	68	70	468	7	1	27	1,188	1,219	1,500	152	160	128	9,013
	20	55			4	1			84	36	42	7		3	252
	36	92	25	1	24				164	98	56	5	8	9	518
1	39	202				21			85	111	55	14	5	3	536
1	95	349	25	1	28	22			333	245	153	26	13	15	1,305
	3	12							13	4	3	3	1	6	45
19	23	127	4	1	8	3	2	1	92	59	89	10	1	3	423
4	24	94			11				116	64	34	3	14	13	373
12	26	73	3	12	25				118	31	11	2	5	3	309
35	76	306	7	13	44	3	2	1	339	158	137	18	21	25	1,150
	25	69	1		4			1	89	34	87	11	10	6	337
	19	186	3		45				353	108	295	100	36	42	1,187
	16	37			38	4			103	26	86	9	9	10	338

## APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances each Inspection Division, during the

DIVISION.	MEASURES OF CAPACITY.									
	Dominion.									
	Bushel.	$\frac{1}{2}$ Bushel.	Peck.	Gallon.	$\frac{1}{2}$ Gallon.	Quart.	Pint.	$\frac{1}{4}$ Pint.	Gill.	$\frac{1}{8}$ Gill.
<i>Ontario.</i>										
Belleville .....	7	11	22	156	278	666	483	58	2	1,683
Hamilton .....	12	167	238	537	711	1,539	1,264	161	.....	4,629
Kingston .....	173	1,507	1,834	2,431	1,243	1,930	1,048	96	11	10,273
London .....	1	171	143	993	1,579	3,363	3,734	679	.....	10,663
Orillia .....	.....	9	16	190	397	574	390	30	11	1,626
Ottawa .....	.....	115	124	388	535	841	744	304	83	3,134
Toronto .....	3	36	310	1,030	2,282	3,663	3,438	488	2	11,252
Windsor .....	2	108	117	484	568	910	565	83	2	2,840
<i>Quebec.</i>	198	2,124	2,804	6,209	7,593	13,486	11,666	1,899	111	46,100
Montreal .....	.....	868	944	2,942	2,800	3,354	3,636	2,420	1,488	18,454
Quebec .....	3	173	147	722	1,043	1,157	1,177	821	352	5,603
Sherbrooke .....	1	53	61	200	396	550	245	93	26	1,626
Three Rivers .....	.....	310	168	529	831	857	628	403	149	3,931
<i>New Brunswick.</i>	4	1,404	1,320	4,393	5,070	5,918	5,686	3,737	2,015	29,614
Fredericton .....	.....	32	28	162	229	151	82	31	4	719
King's .....	.....	1	1	206	331	260	118	23	2	942
St. John .....	.....	461	260	470	723	600	481	226	96	3,317
<i>Nova Scotia.</i>	.....	494	289	838	1,283	1,011	681	280	102	4,978
Cape Breton .....	.....	12	5	8	20	68	24	48	.....	185
Halifax .....	3	83	55	224	200	297	308	118	65	1,363
Pictou .....	.....	9	11	90	241	278	141	36	.....	806
Yarmouth .....	12	24	14	138	230	187	102	24	1	732
<i>Prince Edward Island.</i>	15	128	85	460	691	830	575	226	66	3,086
Charlottetown .....	3	5	.....	6	23	154	78	28	.....	297
<i>Manitoba.</i>										
Winnipeg .....	57	48	2	84	195	493	302	27	.....	1,208
<i>British Columbia.</i>										
Victoria .....	.....	.....	.....	.....	26	24	48	24	.....	122

## D—Continued.

and Weighing Machines of each Denomination Inspected and Verified, in Fiscal Year ended 30th June, 1889.

Irregular Measurements.	BALANCES.														Total Number Verified.
	With Equal Arms.				Steelyards, with Divided Arms.				Weigh-bridges, or Platform Scales.						
	Verified.	5 lbs. and under.	5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	
1	72	263			89	2	1		285	57	257	72	25	37	1,160
10	1,537	2,511			3,499	114	257	2	3,661	601	2,617	399	57	129	15,384
199	90	263	5		34	1			389	127	374	55	14	64	1,416
	67	159			61	1			223	23	385	51	8	68	1,046
	95	239			105		1	3	327	23	380	68		74	1,315
2	49	439			1				594	147	420	33	39	25	1,747
52	371	602			480	4	4	2	629	74	432	87	39	127	2,851
	285	503			113	1			759	108	601	142	21	98	2,631
264	2,566	4,979	5		4,382	123	263	7	6,867	1,160	5,466	907	203	622	27,550
18	450	1,662		6	382	4	1	25	775	666	951	119	123	97	5,261
	247	877	25	55	32	2		1	89	250	166	16	5	9	1,774
	26	153			21				146	92	143	7	20	13	621
	25	501	42	6	16	1			165	184	204	8	8	7	1,167
18	748	3,193	67	67	451	7	1	26	1,175	1,192	1,464	150	156	126	8,823
	20	55			4	1			84	36	42	7		3	252
	36	92	25	1	24				164	98	56	4	7	8	515
1	39	201			21				85	111	55	14	5	3	534
1	95	348	25	1	49	1			333	245	153	25	12	14	1,301
	3	12							13	4	3	3	1	6	45
19	23	127	4	1	8	3	2		92	59	89	10	1	3	422
4	13	83			11				109	60	34	3	14	13	240
12	26	72	3	12	25				117	31	11	2	5	3	307
35	65	294	7	13	44	3	2		331	154	137	18	21	25	1,114
	25	69	1		4			1	89	34	87	11	10	6	337
	18	181	3		43				339	107	286	100	34	39	1,150
	13	37			33	2			103	26	86	9	9	10	328



## APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances each Inspection Division, during

DIVISION.	MEASURES OF CAPACITY.									
	Dominion.									
	Bushel.	$\frac{1}{2}$ Bushel.	Peck.	Gallon.	$\frac{1}{2}$ Gallon.	Quart.	Pint.	$\frac{1}{2}$ Pint.	Gill.	$\frac{1}{2}$ Gill.
<i>Ontario.</i>										
Belleville.....										5
Hamilton.....		1	4							314
Kingston.....	9	35	47	57	57	58	50	1		1
London.....						1				
Orillia.....						1	3	1		6
Ottawa.....					1					2
Windsor.....			1		1					
<i>Quebec.</i>	9	36	52	57	59	60	53	2		328
Montreal.....										
Quebec.....					2					2
Sherbrooke.....		8	10	4	5	1	1	4	1	34
Three Rivers.....		11	6	7		3	1			28
<i>New Brunswick.</i>		19	16	11	7	4	2	4	1	64
King's.....										
St. John.....			1	1						2
<i>Nova Scotia.</i>			1	1						2
Halifax.....										
Pictou.....		4								4
Yarmouth.....		1								1
<i>Manitoba.</i>		5								5
Winnipeg.....				1						1
<i>British Columbia.</i>										
Victoria.....										

D—*Concluded.*

and Weighing Machines of each Denomination Inspected and Rejected in the Fiscal Year ended 30th June, 1888.

## BALANCES.

With Equal Arms.				Steelyards, with Divided Arms.				Weigh-Bridges, or Platform Scales.						Total Number Rejected.
5 lbs. and under.	5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.	
4	9			2				8	3	3			1	1
25	19	1		12				17	20	25	3	1	3	36
1	1			1				10	4	5			1	134
	1		1											22
								1	1	15	1		4	2
														1
30	30	1	1	15				36	28	48	9	2	18	222
5	30		1	14			1	3	13	16		2	1	88
2	12		2	3				1	3	4				27
2	5							9	7	7		2		32
1	27	1							4	9			1	43
10	74	1	3	17			1	13	27	36	2	4	2	190
	1										1	1	1	3
														1
	1										1	1	1	4
							1							1
11	11							7	4					33
	1							1						2
11	12						1	8	4					36
1	5			2				14	1	9		2	3	37
3				5	2									10

## APPENDIX E.

## STATEMENT of Gas Inspection Expenditure and Receipts for the Year ended 30th June, 1889.

Districts.	Inspector.	EXPENDITURE.						Receipts.
		Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Total.	
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
<i>Ontario.</i>								
Belleville.....	Wm. Johnson...	158 33		37 50		80 83	276 66	62 50
Brockville.....	H. J. Hubertus...				57 35	75	58 10	65 75
Cobourg.....	Thos. Cahill.....	68 75		75 00	28 05	7 15	178 95	38 25
Cornwall.....	Wm. Burrows.....		22 50		101 30	54 05	177 85	14 00
Deseronto.....	Wm. Johnson.....	91 63					91 63	
Hamilton.....	D. McPhie.....	1,008 33	22 00	58 00	190 48	55 59	1,334 40	628 00
Kingston.....	Wm Burrows.....	400 00	27 00	45 00	47 20	78 72	597 92	80 00
Lindsay.....	Thos. Cahill.....	68 75		75 00	19 60	25	163 60	
London.....	John Williams.....	1,000 00	15 00	60 00	351 50	393 58	1,820 08	585 50
Ottawa.....	H. J. Hubertus.....	530 52		250 00	70 45	178 98	1,029 95	213 25
Peterborough.....	Thos. Cahill.....	139 50		100 00		3 00	242 50	60 00
Port Hope.....	do.....	68 75			22 85	12 25	103 85	24 00
Toronto.....	J. K. Johnstone.....	1,000 00			14 75	133 48	1,148 23	2,531 25
	District Inspec'r.				37 77		37 77	
		4,534 56	86 50	700 50	941 30	998 63	7,261 49	4,302 50
<i>Quebec.</i>								
Montreal.....	(N. Aubin. ) (Wm. Hartt. )	1,316 64	913 00	40 00	89 40	95 63	2,454 67	2,141 00
Quebec.....	N. Lavoisier.....	1,150 00		42 00		318 12	1,510 12	347 25
Sherbrooke.....	H. J. Pennoyer.....		99 96		21 70	8 10	129 76	27 00
Three Rivers.....	N. Marchand.....	200 00				1 75	201 75	25 00
		2,666 64	1,012 96	82 00	111 10	423 60	4,296 30	2,540 25
<i>New Brunswick.</i>								
Chatham.....	R. A. Lawlor.....	150 00				18 00	168 00	2 00
Fredericton.....	S. A. Purdee.....	200 00					200 00	45 00
Moncton.....	R. A. Lawlor.....	150 00			44 45		194 45	37 00
St. John.....	A. Rowan.....	1,000 00			32 94	32 50	1,065 44	238 50
		1,500 00			77 39	50 50	1,627 89	326 50
<i>Nova Scotia.</i>								
Halifax.....	A. Miller.....	1,300 00		222 50	425 56	79 01	2,027 07	471 25
Pictou.....								
Yarmouth.....								
<i>P. E. Island.</i>								
Charlottetown..	Joseph Knight..	200 00				29 00	229 00	47 00
<i>Manitoba.</i>								
Winnipeg.....	R. T. Huggard..	200 00		108 00		11 15	319 15	54 75
<i>British Columbia</i>								
Victoria.....	Richard Jones...	200 00		210 00			410 00	180 50

APPENDIX E—*Concluded.*

STATEMENT of Gas Inspection Expenditure and Receipts for the Year ended 30th June, 1889.—*Concluded.*

## RECAPITULATION.

	EXPENDITURE.						Receipts.
	Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Total.	
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Ontario .....	4,534 56	86 50	700 50	941 30	998 63	7,261 49	4,302 50
Quebec .....	2,666 64	1,012 96	82 00	111 10	423 60	4,296 30	2,540 25
New Brunswick.....	1,500 00			77 39	50 50	1,627 89	326 50
Nova Scotia.....	1,300 00		222 50	425 56	79 01	2,027 07	471 25
Prince Edward Island..	200 00				29 00	229 00	47 00
Manitoba.....	200 00		108 00		11 15	319 15	54 75
British Columbia.....	200 00		210 00			410 00	180 50
General Expenses.....	150 00				2,040 87	2,190 87	
Queen's Printer.....					97 02	97 02	
Stationery .....					80 17	80 17	
	10,751 20	1,099 46	1,323 00	1,555 35	3,809 95	18,538 96	7,922 75

## APPENDIX F.

RETURN of Gas Meters presented for Verification, Verified, Verified after First Rejection and Rejected, during the Year ended 30th June, 1889.

Inspection Office.	Presented for Veri- fication.	Kind.		Verified as coming within the Error tolerated by Law.			Verified after First Rejection.			Rejected.			Total Verified and Rejected.	
		Wet.	Dry.	Correct.	Fast.	Slow.	Correct.	Fast.	Slow.	Unsound.	Fast.	Slow.	Verified.	Rejected.
Belleville.....	56		56	22	14	19						1	55	1
Brantford.....	111		111	23	41	47							111	
Brockville.....	93		93	1	29	55		1	3			8	85	8
Chatham.....	35		35	13	10	11				1			34	1
Cobourg.....	25		25	6	4	15							25	
Cornwall.....	3		3		1	2							3	
Dundas.....	23		23	3	4	16							23	
Guelph.....	122		122	27	14	80				1			121	1
Hamilton.....	381		381	58	33	288				2			379	2
Ingersoll.....	16		16	6	7	3							16	
Kingston.....	124		124	6	29	87				1	1	1	122	2
London.....	381		381	133	63	177	2	1	1	2	5	1	373	8
Ottawa.....	165		165	14	52	93		1	2		2	4	159	6
Peterboro.....	14		14	9	3	2							14	
Stratford.....	56		56	14	9	32				1			55	1
St. Catharines.....	115		115	30	25	58					2	5	113	2
St. Thomas.....	118		118	44	15	46	3	3	1	2	6	5	105	13
Toronto.....	3,561		3,561	520	565	2,415				7	32	22	3,500	61
Windsor.....	22		22	7	8	6					1		21	1
Woodstock.....	14		14	4	6	2					2		12	2
Montreal.....	2,725		2,725	384	820	1,482				1	36	2	2,686	39
Quebec.....	277	147	130	36	124	111		1			6		271	6
Sherbrooke.....	6		6		6								6	
Three Rivers.....	2		2	1	1								2	
Fredericton.....	41		41	3	11	25					1	1	39	2
St. John.....	242		242	51	36	154						1	241	1
Halifax.....	462	362	100	198	130	129	2	5	6	1	4		457	5
Pictou.....	18		18	3	5	9			1	1			17	1
Yarmouth.....	12		12	5	6	1	1						12	
Charlottetown.....	65		65	9	11	10				23	7	5	30	35
Winnipeg.....	45		45	22	9	14							45	
Victoria.....	299		299	88	73	138							299	
	9,629	509	9,120	1,740	2,164	5,527	8	12	14	38	107	53	9,431	198

---

---

# INSPECTION OF GAS AND GAS METERS.

---

---

## APPEN

## RETURN of Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest.	Lowest.	Average.
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Bellefville :—									
July.....	18·97	17·60	18·45	16	0	3			
August.....	17·11	16·39	16·75	16	0	2			
September.....	16·48	16·14	16·41	16	0	3			
October.....	23·23	20·75	21·65	16	0	5			
November.....	23·44	21·27	22·69	16	0	3			
December.....	18·83	15·37	17·16	16	1	4			
January.....	22·69	22·50	22·59	16	0	2			
February.....	20·31	19·32	19·86	16	0	3			
March.....									
April.....	19·63	19·46	19·54	16	0	2			
May.....	22·10	18·40	20·46	16	0	5			
June.....	22·48	18·42	21·04	16	0	4			
					1	36			
Brantford :—									
July.....			18·29	16	0	1			
August.....			19·97	16	0	1			
September.....			18·50	16	0	1			
October.....			19·18	16	0	1			
November.....			21·73	16	0	1			
December.....			21·68	16	0	1			
January.....			19·57	16	0	1			
February.....			20·54	16	0	1			
March.....			19·73	16	0	1			
April.....			19·28	16	0	1			
May.....			17·94	16	0	1			
June.....			19·44	16	0	1			
					0	12			
Brockville :—									
July.....	22·76	20·23	21·72	16	0	3			
August.....	22·29	18·32	19·70	16	0	3			
September.....	20·10	17·83	18·95	16	0	3			
October.....	19·91	19·52	19·71	16	0	2			
November.....	22·65	20·83	21·74	16	0	2			
December.....	20·00	18·87	19·43	16	0	2			
January.....			20·67	16	0	1			
February.....									
March.....									
April.....									
May.....									
June.....									
					0	16			





## APPENDIX

## Return of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Chatham :—									
July.....			17.09	16	0	1			
August.....			17.35	16	0	1			
September.....			17.60	16	0	1			
October.....			16.50	16	0	1			
November.....			16.62	16	0	1			
December.....			17.00	16	0	1			
January.....			16.86	16	0	1			
February.....			16.86	16	0	1			
March.....			16.19	16	0	1			
April.....			16.95	16	0	1			
May.....			16.36	16	0	1			
June.....			16.36	16	0	1			
					0	12			
Cobourg :—									
July.....			16.67	16	0	1			
August.....			16.63	16	0	1			
September.....			17.02	16	0	1			
October.....			16.48	16	0	1			
November.....			16.19	16	0	1			
December.....			17.00	16	0	1			
January.....			16.40	16	0	1			
February.....			17.14	16	0	1			
March.....			17.35	16	0	1			
April.....			17.94	16	0	1			
May.....			17.58	16	0	1			
June.....									
					0	11			
Cornwall :—									
July.....			22.53	16	0	1			
August.....			22.09	16	0	1			
September.....			23.49	16	0	1			
October.....			7.75	16	1	1			
November.....			16.65	16	0	1			
December.....			17.47	16	0	1			
January.....			15.08	16	1	1			
February.....			15.70	16	1	1			
March.....			15.06	16	1	1			
April.....			16.64	16	0	1			
May.....			14.83	16	1	1			
June.....			17.80	16	0	1			
					5	12			

Digitized by Google

# APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
<b>Dundas :—</b>									
July.....			17·85	16	0	1			
August.....			18·30	16	0	1			
September.....			18·19	16	0	1			
October.....			19·00	16	0	1			
November.....			19·42	16	0	1			
December.....			19·57	16	0	1			
January.....			17·20	16	0	1			
February.....			16·99	16	0	1			
March.....			18·55	16	0	1			
April.....			17·85	16	0	1			
May.....			19·57	16	0	1			
June.....			16·86	16	0	1			
					0	12			
<b>Guelph :—</b>									
July.....			18·35	16	0	1			
August.....			18·45	16	0	1			
September.....			18·47	16	0	1			
October.....			18·35	16	0	1			
November.....			21·34	16	0	1			
December.....			18·39	16	0	1			
January.....			19·34	16	0	1			
February.....			18·88	16	0	1			
March.....			19·06	16	0	1			
April.....			18·19	16	0	1			
May.....			19·23	16	0	1			
June.....			18·68	16	0	1			
					0	12			
<b>Hamilton :—</b>									
July.....			16·81	16	0	1			
August.....			16·70	16	0	1			
September.....			17·20	16	0	1			
October.....			16·12	16	0	1			
November.....			17·87	16	0	1			
December.....			16·43	16	0	1			
January.....			18·46	16	0	1			
February.....			16·36	16	0	1			
March.....			17·35	16	0	1			
April.....			19·50	16	0	1			
May.....			18·56	16	0	1			
June.....			18·65	16	0	1			
					0	12			



# APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest.	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Ingersoll :—									
July.....			18·44	16	0	1			
August.....			17·35	16	0	1			
September.....			17·11	16	0	1			
October.....			17·21	16	0	1			
November.....			17·40	16	0	1			
December.....			18·37	16	0	1			
January.....			17·50	16	0	1			
February.....			17·00	16	0	1			
March.....			17·00	16	0	1			
April.....			17·00	16	0	1			
May.....			17·94	16	0	1			
June.....			17·00	16	0	1			
					0	12			
Kingston :—									
July.....	24·00	22·62	23·14	16	0	3			
August.....	24·02	22·08	23·05	16	0	2			
September.....	23·84	20·30	22·00	16	0	4			
October.....	25·96	21·46	23·36	16	0	4			
November.....	25·85	20·67	22·79	16	0	4			
December.....	23·47	20·50	22·27	16	0	5			
January.....	22·68	21·16	21·68	16	0	4			
February.....	22·34	19·90	21·41	16	0	4			
March.....	22·86	20·77	21·63	16	0	4			
April.....	22·30	21·10	21·67	16	0	1			
May.....	22·44	20·23	21·42	16	0	4			
June.....	22·04	21·52	21·77	16	0	4			
					0	46			
Lindsay :—									
July.....			23·70	16	0	1			
August.....			24·27	16	0	1			
September.....			23·86	16	0	1			
October.....			24·37	16	0	1			
November.....			22·50	16	0	1			
December.....			21·30	16	0	1			
January.....			22·00	16	0	1			
February.....			23·42	16	0	1			
March.....			19·66	16	0	1			
April.....			23·87	16	0	1			
May.....			20·20	16	0	1			
June.....			23·75	16	0	1			
					0	12			



# APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	Times in excess of Allowance.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
London :—									
July.....	22·23	20·65	21·37	16	0	3			
August.....	20·00	19·91	19·97	16	0	3			
September.....	23·62	19·40	20·97	16	0	3			
October.....	22·02	18·84	20·69	16	0	3			
November.....	20·32	19·76	20·05	16	0	3			
December.....	22·00	20·91	21·37	16	0	3			
January.....	21·48	19·41	20·50	16	0	3			
February.....	22·45	20·00	21·02	16	0	3			
March.....	22·11	21·46	21·72	16	0	3			
April.....	20·82	20·01	20·49	16	0	3			
May.....	20·50	19·41	20·00	16	0	3			
June.....	20·00	19·11	19·43	16	0	3			
					0	36			
Ottawa :—									
July.....	16·50	14·53	15·70	16	3	5	24·18	16·31	20·73
August.....	16·09	13·10	14·94	16	4	5	20·34	15·98	17·98
September.....	17·23	14·37	15·44	16	3	4	18·46	17·16	17·81
October.....	16·30	16·30	16·30	16	0	1	24·04	24·04	24·04
November.....	15·92	14·17	15·07	16	3	3	17·18	13·62	15·22
December.....	15·25	12·50	13·92	16	3	3	16·80	15·30	15·98
January.....	15·30	14·53	14·83	16	3	3	47·87	11·91	26·80
February.....									
March.....	17·67	17·03	17·35	16	0	2	26·60	24·34	25·47
April.....	19·59	18·59	18·57	16	0	5	14·33	8·19	10·34
May.....	20·87	18·53	19·74	16	0	4	11·19	11·19	11·19
June.....	19·62	19·62	19·62	16	0	1	11·63	11·63	11·63
					19	36			
Peterborough :—									
July.....			17·30	16	0	1			
August.....			17·30	16	0	1			
September.....			18·63	16	0	1			
October.....			17·64	16	0	1			
November.....			17·46	16	0	1			
December.....			17·76	16	0	1			
January.....			17·64	16	0	1			
February.....			17·80	16	0	1			
March.....			17·94	16	0	1			
April.....			18·70	16	0	1			
May.....			17·70	16	0	1			
June.....			17·70	16	0	1			
					0	12			

G—Continued.

Inspected during the Year ended 30th June, 1889.

100 Cubic Feet.			Ammonia per 100 Cubic Feet.					Sulphuretted Hydrogen.				Remarks.
Standard.	Times in excess of Allowance.	No. of Tests.	Highest	Lowest	Average	Standard.	Times in excess of Allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.						
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	Inspector ill; no inspection. By Acting Inspector Code do do do do
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	0	3	
.....	.....	.....	.....	.....	.....	.....	.....	.....	36	0	36	
35	0	3	3.14	2.00	2.65	4	0	3	5	0	5	Inspector ill; no inspection. By Acting Inspector Code do do do do
35	0	3	2.54	2.04	2.30	4	0	3	5	0	5	
35	0	2	3.03	2.55	2.79	4	0	2	4	0	4	
35	0	1	2.55	2.55	2.55	4	0	1	1	0	1	
35	0	3	2.87	2.04	2.48	4	0	3	3	0	3	
35	0	3	2.54	2.29	2.41	4	0	3	3	0	3	
35	1	3	3.34	2.01	2.41	4	0	3	3	0	3	
35	0	2	2.10	2.00	2.05	4	0	2	2	0	2	
35	0	3	0.00	0.00	0.00	4	0	3	5	0	5	
35	0	1	26.04	26.04	26.04	4	0	1	4	0	4	
35	0	1	0.00	0.00	0.00	4	0	1	1	0	1	
.....	1	25	.....	.....	.....	.....	0	25	36	0	36	Inspector ill; no inspection. By Acting Inspector Code do do do do
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0	1	
.....	.....	.....	.....	.....	.....	.....	.....	.....	11	1	12	



## APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times be- low Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Port Hope :—									
July .....			17·26	16	0	1			
August .....			18·00	16	0	1			
September .....			17·21	16	0	1			
October .....			17·35	16	0	1			
November .....			17·20	16	0	1			
December .....			17·72	16	0	1			
January .....			16·73	16	0	1			
February .....			17·63	16	0	1			
March .....			17·26	16	0	1			
April .....			18·39	16	0	1			
May .....			17·50	16	0	1			
June .....									
					0	11			
Stratford :—									
July .....			17·60	16	0	1			
August .....			17·85	16	0	1			
September .....			16·86	16	0	1			
October .....			16·86	16	0	1			
November .....			16·50	16	0	1			
December .....			16·89	16	0	1			
January .....			16·86	16	0	1			
February .....			17·32	16	0	1			
March .....									
April .....			18·80	16	0	1			
May .....			16·38	16	0	1			
June .....			16·77	16	0	1			
					0	11			
Stratford, (W. Gordon's Co.)									
July .....									
August .....									
September .....									
October .....									
November .....									
December .....									
January .....									
February .....									
March .....									
April .....									
May .....									
June .....									

Digitized by Google

## APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest.	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
St. Catharines :—									
July .....			19'44	16	0	1			
August .....			20'64	16	0	1			
September .....			21'14	16	0	1			
October .....			18'44	16	0	1			
November .....			20'11	16	0	1			
December .....			19'34	16	0	1			
January .....			17'79	16	0	1			
February .....			19'22	16	0	1			
March .....			19'34	16	0	1			
April .....			19'32	16	0	1			
May .....			18'50	16	0	1			
June .....			19'00	16	0	1			
					0	12			
St. Thomas :—									
July .....			16'44	16	0	1			
August .....			16'43	16	0	1			
September .....			16'36	16	0	1			
October .....			16'00	16	0	1			
November .....			16'50	16	0	1			
December .....			16'50	16	0	1			
January .....			16'94	16	0	1			
February .....			17'65	16	0	1			
March .....			16'86	16	0	1			
April .....			16'09	16	0	1			
May .....			16'18	16	0	1			
June .....			16'36	16	0	1			
					0	12			
Toronto :—									
July .....	17'56	16'84	17'22	16	0	8	12'60	12'04	12'32
August .....	17'45	16'47	17'18	16	0	9	14'05	11'32	12'68
September .....	17'76	17'06	17'45	16	0	9	13'61	11'60	12'60
October .....	18'44	17'21	17'85	16	0	9	16'65	13'74	15'19
November .....	18'85	16'81	17'46	16	0	9	13'99	12'29	13'14
December .....	18'06	17'06	17'67	16	0	8	17'36	16'80	17'08
January .....	18'09	16'52	17'31	16	0	9	15'67	14'11	14'89
February .....	18'26	16'50	17'52	16	0	8	16'49	14'59	15'54
March .....	18'96	16'91	17'88	16	0	9	17'07	14'39	15'73
April .....	19'13	17'64	18'08	16	0	9	11'25	9'50	10'37
May .....	19'44	17'08	18'07	16	0	8	14'49	11'11	12'80
June .....	19'35	16'20	17'50	16	0	9	13'98	8'94	11'46
					0	104			



# APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of tests.	Highest.	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
<b>Windsor :—</b>									
July.....			17·60	16	0	1			
August.....			16·63	16	0	1			
September.....			18·00	16	0	1			
October.....			17·14	16	0	1			
November.....			16·70	16	0	1			
December.....			17·20	16	0	1			
January.....			17·00	16	0	1			
February.....			16·36	16	0	1			
March.....			17·00	16	0	1			
April.....			17·10	16	0	1			
May.....			16·57	16	0	1			
June.....			16·97	16	0	1			
					0	12			
<b>Woodstock :—</b>									
July.....			20·19	16	0	1			
August.....			20·30	16	0	1			
September.....			20·00	16	0	1			
October.....			20·65	16	0	1			
November.....			20·27	16	0	1			
December.....			20·48	16	0	1			
January.....			18·88	16	0	1			
February.....			19·48	16	0	1			
March.....			18·59	16	0	1			
April.....			20·44	16	0	1			
May.....			20·03	16	0	1			
June.....			19·27	16	0	1			
					5	12			
<b>Montreal :—</b>									
July.....	19·41	16·44	17·82	16	0	9	32·25	20·27	26·26
August.....	19·73	16·92	18·07	16	0	9	40·53	8·39	24·46
September.....	20·03	17·24	18·24	16	0	9	43·63	25·56	34·59
October.....	19·51	16·45	18·17	16	0	9	41·30	35·40	38·30
November.....	20·45	17·10	18·61	16	0	8	20·40	13·58	16·99
December.....	19·52	16·48	18·05	16	0	10	66·74	24·33	48·08
January.....	22·73	16·26	19·20	16	0	11	45·36	13·53	28·13
February.....	22·32	17·70	19·08	16	0	8	49·63	4·19	21·11
March.....	19·15	17·44	18·23	16	0	9	20·75	9·63	15·44
April.....	20·17	17·27	18·29	16	0	9	67·46	12·34	44·49
May.....	19·35	17·15	18·17	16	0	8	65·14	11·62	40·91
June.....	21·77	18·18	19·89	16	0	9	52·61	46·51	49·56
					0	108			



## APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Quebec :—									
July.....			18·70	16	0	1	14·80	13·36	14·08
August.....			17·51	16	0	1	13·43	11·12	12·27
September.....			17·81	16	0	1	12·87	12·51	12·69
October.....			17·94	16	0	1	23·72	18·76	21·24
November.....			16·55	16	0	1	17·65	16·22	16·93
December.....			17·34	16	0	1	12·78	11·32	12·05
January.....			18·85	16	0	1	16·25	12·53	14·39
February.....			16·60	16	0	1	12·56	12·17	12·36
March.....			16·84	16	0	1	23·67	15·91	19·79
April.....			22·13	16	0	1	16·95	15·91	16·43
May.....			16·91	16	0	1	16·87	14·43	15·65
June.....			17·51	16	0	1	19·16	18·50	18·83
					0	12			
Sherbrooke :—									
July.....			26·01	16	0	1			
August.....			28·52	16	0	1			
September.....			25·43	16	0	1			
October.....			26·41	16	0	1			
November.....			30·67	16	0	1			
December.....			29·90	16	0	1			
January.....			24·00	16	0	1			
February.....			24·93	16	0	1			
March.....			26·03	16	0	1			
April.....			24·75	16	0	1			
May.....			22·31	16	0	1			
June.....			27·33	16	0	1			
					0	12			
Three Rivers :—									
July.....	18·59	17·16	17·59	16	0	5			
August.....	16·97	16·04	16·57	16	0	4			
September.....	17·49	16·26	16·82	16	0	4			
October.....	17·35	16·07	16·79	16	0	5			
November.....	17·61	16·80	17·19	16	0	4			
December.....	17·10	16·01	16·44	16	0	4			
January.....	16·55	16·16	16·40	16	0	5			
February.....	17·18	16·13	16·42	16	0	4			
March.....	16·47	15·71	16·16	16	1	5			
April.....	17·01	16·16	16·68	16	0	4			
May.....	16·78	16·05	16·47	16	0	4			
June.....	18·85	16·43	17·20	16	0	4			
					1	52			





# APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
<b>Fredericton :—</b>									
July.....			17·54	16	0	1			
August.....			17·29	16	0	1			
September.....			16·95	16	0	1			
October.....			17·90	16	0	1			
November.....			16·91	16	0	1			
December.....			17·40	16	0	1			
January.....			16·75	16	0	1			
February.....			16·87	16	0	1			
March.....									
April.....			16·94	16	0	1			
May.....			16·65	16	0	1			
June.....			16·64	16	0	1			
					0	11			
<b>St. John :—</b>									
July.....	17·65	16·36	17·00	16	0	8	21·40	17·76	19·36
August.....	17·65	16·67	17·16	16	0	7	20·38	15·88	18·28
September.....	17·71	16·36	17·14	16	0	7	22·79	18·48	20·45
October.....	17·71	16·34	16·92	16	0	6	20·18	18·69	19·48
November.....	17·17	16·36	16·90	16	0	7	22·72	15·60	18·36
December.....	17·71	16·70	17·18	16	0	7	22·69	19·43	20·53
January.....	17·49	16·22	16·97	16	0	8	19·85	16·51	18·03
February.....	17·99	16·36	16·88	16	0	8	22·30	15·85	18·90
March.....	17·35	16·36	16·77	16	0	8	22·85	15·97	18·79
April.....	17·93	16·47	16·90	16	0	8	22·65	16·83	19·62
May.....	17·48	16·04	16·84	16	0	8	20·04	16·81	18·78
June.....	17·28	16·28	16·66	16	0	8	22·67	16·68	19·51
					0	90			
<b>Halifax :—</b>									
July.....	18·49	17·70	18·09	16	0	2	29·38	23·23	26·30
August.....	19·36	18·75	19·05	16	0	2	22·97	22·97	22·97
September.....	19·03	18·38	18·70	16	0	2	26·76	24·67	25·71
October.....	19·56	19·45	19·50	16	0	2	16·60	6·98	11·79
November.....	19·40	18·00	18·70	16	0	2	10·69	8·17	9·43
December.....	19·37	19·12	19·24	16	0	2	24·09	9·85	16·97
January.....	19·94	19·67	19·80	16	0	2	11·05	8·75	9·90
February.....	19·33	18·49	18·91	16	0	2	13·78	11·33	12·55
March.....	20·28	20·27	20·27	16	0	2	9·55	9·46	9·50
April.....	23·70	21·91	22·80	16	0	2	9·68	8·26	8·97
May.....	22·72	20·80	21·76	16	0	2	14·21	8·26	11·23
June.....	21·45	20·15	20·80	16	0	2	13·88	13·78	13·83
					0	24			

G—Continued.

Inspected during the Year ended 30th June, 1889.

100 Cubic Feet.			Ammonia per 100 Cubic Feet.			Sulphuretted Hydrogen.			Remarks.
Standard.	Times in excess of Allowance.	No. of Tests.	Highest	Lowest	Average	Standard.	Times in excess of Allowance.	No. of Tests.	
Grains.			Grains.	Grains.	Grains.	Grains.			
							No. of times absent.	No. of times present.	
							1	0	1
							1	0	1
							1	0	1
							0	1	1
							0	1	1
							0	1	1
							0	1	1
							1	0	1
							1	0	1
							1	0	1
							8	3	11
35	0	5	1.08	.59	.95	4	0	5	8
35	0	4	1.75	.65	1.37	4	0	4	7
35	0	4	2.67	1.25	2.20	4	0	4	7
35	0	4	2.40	.55	1.59	4	0	4	6
35	0	4	1.05	.46	.75	4	0	4	7
35	0	4	1.55	1.12	1.26	4	0	4	7
35	0	4	1.00	.45	.73	4	0	4	8
35	0	4	2.60	.40	1.48	4	0	4	8
35	0	4	1.20	.60	.99	4	0	4	8
35	0	4	2.63	1.18	1.89	4	0	4	8
35	0	4	2.58	.55	1.61	4	0	4	8
35	0	4	1.39	.25	.87	4	0	4	8
	0	49					0	49	90
35	0	2	.00	.00	.00	4	0	2	2
35	0	2	.00	.00	.00	4	0	2	2
35	0	2	.00	.00	.00	4	0	2	2
35	0	2	2.03	.78	1.395	4	0	2	2
35	0	2	1.73	1.49	1.614	4	0	2	2
35	0	2	1.24	.997	1.1185	4	0	2	2
35	0	2	.00	.00	.00	4	0	2	2
35	0	2	.503	.00	.2515	4	0	2	2
35	0	2	1.02	.778	.899	4	0	2	2
35	0	2	1.51	.596	1.055	4	0	2	2
35	0	2	.00	.00	.00	4	0	2	2
35	0	2	.00	.00	.00	4	0	2	2
	0	24					0	24	24

# APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest.	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Pictou :—									
July.....			20·63	16	0	1			
August.....			18·20	16	0	1			
September.....			19·13	16	0	1			
October.....			16·72	16	0	1			
November.....			19·30	16	0	1			
December.....			18·41	16	0	1			
January.....			18·70	16	0	1			
February.....			18·95	16	0	1			
March.....			18·60	16	0	1			
April.....			19·27	16	0	1			
May.....			19·00	16	0	1			
June.....			19·75	16	0	1			
					0	12			
Yarmouth :—									
July.....			17·50	16	0	1			
August.....			18·00	16	0	1			
September.....			19·00	16	0	1			
October.....			18·45	16	0	1			
November.....			17·59	16	0	1			
December.....			16·77	16	0	1			
January.....			17·57	16	0	1			
February.....			15·85	16	1	1			
March.....			18·09	16	0	1			
April.....			15·42	16	1	1			
May.....			18·49	16	0	1			
June.....			19·04	16	0	1			
					2	12			
Charlottetown :—									
July.....	20·23	19·29	19·71	16	0	3			
August.....	19·40	18·50	19·00	16	0	3			
September.....	20·03	18·51	19·05	16	0	3			
October.....	18·86	17·97	18·46	16	0	3			
November.....	20·25	17·81	19·27	16	0	3			
December.....	19·10	17·65	18·22	16	0	3			
January.....	20·02	18·13	18·79	16	0	3			
February.....	17·65	17·22	17·41	16	0	3			
March.....	18·24	17·71	17·95	16	0	3			
April.....	19·06	18·85	18·95	16	0	3			
May.....	18·50	17·24	17·88	16	0	3			
June.....	18·43	18·14	18·32	16	0	4			
					0	37			



## APPENDIX

## RETURN of the Illuminating Power and Purity of Gas

Inspection Office.	Illuminating Power.						Sulphur per		
	Highest.	Lowest.	Average.	Standard.	Times in excess of Allowance.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	Candles.			Grains.	Grains.	Grains.
Winnipeg:—									
July.			20·82	16	0	1			
August.			20·70	16	0	1			
September.			20·40	16	0	1			
October.			20·40	16	0	1			
November.			19·40	16	0	1			
December.			20·20	16	0	1			
January.			20·53	16	0	1			
February.			19·52	16	0	1			
March.			21·31	16	0	1			
April.			20·79	16	0	1			
May.			19·20	16	0	1			
June.			19·41	16	0	1			
					0	12			
Victoria:—									
July.	17·87	17·74	17·79	16	0	3			
August.									
September.	18·42	16·92	17·67	16	0	2			
October.	17·94	17·61	17·77	16	0	2			
November.	18·60	18·27	18·41	16	0	3			
December.	18·33	17·34	17·86	16	0	3			
January.	18·07	17·70	17·90	16	0	3			
February.	18·10	17·56	17·81	16	0	3			
March.	18·05	17·57	17·81	16	0	2			
April.	18·24	18·07	18·15	16	0	2			
May.	18·55	18·42	18·48	16	0	2			
June.	18·65	17·46	18·21	16	0	3			
					0	28			



## APPENDIX H.

REPORT on the comparison of the Departmental standards of weight, marked "A," with the Parliamentary copies marked respectively "B" and "C" by W. J. Loudon, Esq., of Toronto University, dated 29th January, 1889.

The Commissioner of Inland Revenue, Ottawa.

SIR,—In accordance with your instructions to examine and compare the Departmental and Parliamentary standards of weight, I commenced on 3rd January, 1889, the comparison of the standard pounds, having spent the preceding three days in adjusting the Oertling, balance No. 1, and in endeavoring to avoid, as far as possible, all constant sources of error. Let me here briefly enumerate and describe the standards of weight in possession of the Dominion of Canada.

1. Departmental standards of weight, in charge of the Weights and Measures Branch of the Inland Revenue Department, consisting of a platino-iridium avoirdupois pound and a platino-iridium Troy ounce. These have been described fully in previous reports and are marked "A." They are enclosed in gold caskets, also marked "A," and the caskets are enclosed in a small cube of bronze, with a lid screwed down by means of four screws, one in each corner, the key for adjusting the screws being itself screwed firmly into a socket in the centre of the lid of the box.

2. Similar copies, similarly enclosed, marked "B," deposited with the Senate.

3. Similar copies, similarly enclosed, marked "C," deposited with the Commons.

In making the comparisons I used Gauss' method, usually adopted in England and Germany in preference to Borda's, the former being known as a method of double weighing and the latter that of substitution. The reason for using Gauss' method is that less observations are required to ensure accuracy. The divisions on the scale of the balance I read with the cathetometer belonging to the Department and I was able, in that way, to read to the tenth part of a single division.

The operation of comparison then was to place a weight in each scale pan and notice the position of equilibrium by watching the oscillations of the pointer and the scale through the cathetometer. Then to interchange the weights and again notice the position of equilibrium; then to add a tenth of a grain to either pan, in order to obtain the value of a division on the scale in grains; three sets of readings were taken in each comparison.

COMPARISON of the platino-iridium avoirdupois pound "A" with platino-iridium avoirdupois pound "B."

	A	B	Position of Equilibrium.	
(1)	In right hand pan—R.	In left hand pan—L.	$M_1 = 61.5$	.1 grain added to A in L gives $M_2 = 64.7$
	In L.	In R.	$M_2 = 60.2$	
(2)	In L.	In R.	$M_1 = 60.15$	.1 grain added to B in L gives $M_2 = 64.91$
	In R.	In L.	$M_2 = 60.43$	
(3)	In R.	In L.	$M_1 = 60.55$	.1 grain added to B in L gives $M_2 = 55.71$
	In L.	In R.	$M_2 = 59.73$	

Temperature = 65° Fahrenheit

Barometer H = 29·7 inches.

The differences :  $M_1 - M_2$  are 1·3, ·28 and ·82

The numbers of divisions for ·1 of a grain are 4·5, 4·48, 4·02.

1·3, ·28, ·82 give a mean of ·8 of a division.

The mean of 4·5, 4·58, 4·02 gives  $4\frac{1}{2}$  divisions.

$4\frac{1}{2}$  divisions =  $\frac{1}{10}$  grain.

1 division =  $\frac{2}{100}$  grains = ·023 grains.

$B = A + \frac{1}{2} (.8) \text{ divisions} = A + \frac{1}{2} (.8 \times .023) \text{ grains} = A + .0022 \text{ grains.}$

Finally "B" is heavier than "A" by ·0092 grains.

COMPARISON of the platino-iridium avoirdupois pound "A" with platino-iridium avoirdupois pound "C."

A	C	Position of Equilibrium.	—
In L.	In R.	$M_1 = 59.67$	·1 grain added to A in R gives $M_2 = 57.33.$
In R.	In L.	$M_2 = 60.23$	
In R.	In L.	$M_1 = 60.13$	·1 grain added to C in R gives $M_2 = 55.51.$
In L.	In R.	$M_2 = 59.6$	
In L.	In R.	$M_1 = 59.8$	·1 grain added to C in L gives $M_2 = 64.9.$
In R.	In L.	$M_2 = 60.33$	

Temperature = 66 Fahrenheit.

Barometer H = 29·6 inches.

Mean of differences,  $M_1 - M_2$  is ·55 divisions.

·1 grain gives as mean 3·88.

$\therefore \frac{1}{10} \text{ grain} = 3.88 \text{ divisions.}$

1 division =  $\frac{1}{38.8}$  grains.

And  $C = A + \frac{1}{2} (.55) \text{ divisions.}$

$C = A + \frac{1}{2} (.55) \times \frac{1}{38.8} \text{ grains} = A + .0071 \text{ grains.}$

Finally "C" is heavier than "A" by ·0071 grains.



COMPARISON of the platino-iridium troy ounce "A" with the platino-iridium Troy ounce "B."

A	B.	Position of Equilibrium.	—
In R.	In L.	$M_1 = 57.08$	.1 grain added to A in L gives $M_2 = 61.$
In L.	In R.	$M_2 = 57.26$	
In L.	In R.	$M_1 = 57.16$	.1 grain added to A in R gives $M_2 = 53.12.$
In R.	In L.	$M_2 = 56.96$	
In R.	In L.	$M_1 = 56.73$	.1 grain added to A in L gives $M_2 = 61.17.$
In L.	In R.	$M_2 = 57.02$	

Temperature =  $67^{\circ}5$  Fahrenheit.

Barometer H = 29.9 inches.

Mean of  $M_1 - M_2$  is .23 divisions.

Mean of divisions for .1 grain is 3.91 divisions.

3.91 divisions = .1 grain =  $\frac{1}{10}$

1 division  $\frac{1}{39.1}$  grains.

$B = A + \frac{1}{2} (.23) \text{ divisions} = A + \frac{1}{2} (.23) \times \frac{1}{39.1} \text{ grains.}$

$B = A + .00294 \text{ grains.}$

"B" is heavier than "A" by .00294 grains.

COMPARISON of the platino-iridium troy ounce "A" with the platino-iridium troy ounce "C."

A	C	Position of Equilibrium.	—
In L.	In R.	$M_1 = 57$	.1 grain added to A in R gives $M_2 = 52.93$
In R.	In L.	$M_2 = 56.97$	
In R.	In L.	$M_1 = 56.95$	.1 grain added to A in L gives $M_2 = 61$
In L.	In R.	$M_2 = 56.98$	
In L.	In R.	$M_1 = 56.97$	.1 grain added to A in R gives $M_2 = 52.8$
In R.	In L.	$M_2 = 56.75$	

Temperature =  $67^{\circ}.5$  Fahrenheit.

Barometer H = 29.9 inches.

Mean of differences,  $M_1 - M_2$  is .03 divisions.

Mean of divisions corresponding to .1 grains = 4.04 div.

and  $A = C + \frac{1}{2} (.03)$  divisions

$$= C + \frac{1}{2} (.03) \times \frac{1}{40.4} \text{ grains,}$$

$$A = C + .00037 \text{ grains.}$$

"A" is heavier than "C" by .00037 grains.

The comparisons then give the following results :—

*Avoirdupois pounds*—

$$B = A + .0092 \text{ grains.}$$

$$C = A + .0071 \text{ do}$$

*Troy ounces.*

$$B = A + .00294 \text{ grains.}$$

$$A = C + .00037 \text{ do}$$

I have not reduced the weights to vacuum as they displace almost equal amounts of air, being practically of same volume and density. I had not time to determine the densities.

In conclusion I may add that the standard weights seem to have preserved their original relative values, and have not deteriorated in any way that I can observe. This is due, without doubt, to the excellent and durable metal of which they are made.

All of which is respectfully submitted.

W. J. LOUDON,  
*Lecturer in Physics, University College, Toronto.*

## REPORT ON THE STANDARDS OF LENGTH.

To the Commissioner of Inland Revenue.

SIR,—I beg leave to submit the following report of the comparisons made by me at Ottawa of the standards of length with each other:—The “Airy” standard yard and the Departmental yard marked “A,” “A” with “B,” the latter of which is in charge of the Senate. “A” with “C,” “C” being the property of the Commons. Also of the comparison made by me of the platino-iridium pound known as “A,” in charge of the Department of Standards, with the bronze commercial pound made in 1844, and presented to the colony of Canada by the British Committee on restored standards.

The “Airy” standard of length and the “bronze pound” are especially interesting on account of their age, being both made about 1844-45. I have taken particular care, as far as lay in my power, to notice if any great change has taken place in either of them, and have not found any alteration of vital importance. In the following summary I have given the results only, without placing down all the figures; these latter will be found in the book which I used in the comparisons, and which I have sent you along with this report.

In the operation of comparing two standards of length I used the comparing apparatus in the basement of the Inland Revenue Department. Unfortunately I was unable to obtain any thermometer but a Fahrenheit one, which read only to about a tenth of a degree, and was graduated in half degrees. Still, by allowing sufficient time to elapse between readings, and by taking proper precautions as to temperature, I think I obtained fairly good results; of course for a rigid investigation it would be absolutely necessary to place the bars in either water or mercury so as to ensure them always being at the same temperature throughout their length.

The first comparison was made between the “Airy” standard and “A.” The differences given by twenty observations were taken and the mean determined. These differences are in divisions of the micrometers, which are attached to the microscopes. The value of the division on each micrometer was the first thing I determined, and as a mean of a large number of readings (see book) I found that:

$$\left\{ \begin{array}{l} 1 \text{ division on micrometer "B"} = \frac{.5}{25228.8} = .0000198 \text{ inches,} \\ \text{and 1 do do "A"} = \frac{.33}{16587.95} = .0000199 \text{ inches.} \end{array} \right.$$

Instead of multiplying the divisions on “A” and on “B” throughout by these values, respectively, I have chosen the mean of the two, and used it as a multiplier, the error caused by so doing not amounting to anything appreciable. Value of one division then is .00001985 inches.

The comparison of "Airy" with "A" gives the following differences:—

"Airy" — A

	0.00	
+	1.35	
+	1.30	
+	1.00	
+	3.30	
+	3.30	
+	5.00	
+	3.90	
+	3.20	
+	.70	
+	4.60	
+	4.90	
+	4.80	
+	3.95	
+	6.30	
+	5.30	
+	2.10	
+	3.00	
	— 0.25	
+	4.30	

Twenty observations give then a mean equivalent to +3.1025 divisions for Airy—A. The value of a division being .00001985 inches, the "Airy" Standard would then be longer than "A" by  $3.1025 \times .00001985$  inches, that is by .0000616 inches.

	+ 62.30	— 0.25
	— 0.25	

20 | + 62.05

3.1025 divisions.

The second comparison made was "A" with "C." The differences are:—

A — C

+	13.4
	11.7
	13.2
	15.4
	14.9
	14.3
	9.1
	10.4
	14.8
	6.4
	10.0
	8.1
	16.1
	4.5
	11.2
	9.0
	11.6
	10.0
	10.7
	10.4

Twenty observations give as a mean + 11.26 divisions. "A" is then longer than "C" by  $11.26 \times .00001985$  inches, that is by .0002235 inches.

20 | 225.2

11.26 divisions.

The third comparison was "A" with "B." The differences are:—

A — B.  
+ 3.4  
7.0  
5.8  
9.9  
8.5  
5.3  
6.6  
7.0  
6.2  
7.9  
9.3  
11.5  
14.5  
12.6  
13.8  
11.4  
12.7  
12.0  
12.1  
11.4  
10.4  
12.0  
10.0

Twenty-three observations give as a mean  $\frac{221.3}{23}$  divisions. "A" is then

longer than "B" by  $\frac{221.3}{23} \times .00001985$  inches.  
That is by .0001913 inches.

221.3 divisions.

23

By referring to the Second Report of Weights and Measures (May 1, 1875), it will be found that according to the comparison made by the Warden of the Standards in London.

"A" = 36.00002841 inches }  
"B" = 35.99994581 " } at the same temperature.  
"C" = 35.99981332 "

From these, then, the last comparison would have given at the same temperature (in the neighborhood of 60° Fahr.) :—

A — B = .0000826 inches.  
A — C = .00021509 "

The present comparison gives

A — B = .0001613 inches.  
and A — C = .0002235 "

The alteration may of course be in A or B or C or in all. Relatively, however, to one another and even absolutely I think it may be said that no change has taken place in the bars A, B, C greater than the fifty thousandth part of an inch.

Regarding the "Airy" standard it was said to have been the same as the Imperial standard at a temperature of 61°·94 Fahr. "A" being standard at 61°·94 Fahr., the difference between the "Airy" and "A" would be

$.03 \times 36 \times \text{coefficient of expansion for } 1^\circ \text{ F.}$   
 $= .03 \times 36 \times .00000985 = .00001$  inches.

That is, A was longer than the "Airy" by .00001 inches.

By my determination the Airy is longer than "A" by .00006 inches.

In my comparison, however, it must be borne in mind that I had no thermometer reliable beyond the tenth part of a degree Fahrenheit, and so, as the difference is so very slight, I could not be justified in saying that the "Airy" is longer than "A" by the above quantity. It would require a new determination, with special apparatus and precautions, to decide on the exact difference and the sign of the difference between A and Airy. But one thing is certain that whatever change has taken place is extremely small.

#### *Comparison of the "Bronze Pound" with "A."*

In the different weighings which were made to find the difference in weight between "Bronze" and "A," I used Gauss' method of double weighing, adding at the

end of each set of readings .1 grain in order to determine the value of one division on the scale of the balance. The Balance used was Oertling's No. 1, and the divisions on the scale were read by means of the cathetometer. In each case, the thermometer, barometer and hygrometer were read. All the readings and calculations will be found in the book which I used. I only give here the results of determinations 4, 5, 6 which I considered to be quite free from error of any constant nature.

These weighings (4, 5, 6) give as results:—

No. 4. "A" = "Bronze" + .6080 grains.

No. 5. "A" = "Bronze" + .6077 "

No. 6. "A" = "Bronze" + .5061 "

As a mean "A" = "Bronze" +  $\frac{1.8218}{3}$  = "Bronze" + .6072 grains.

3

These weighings are made of course in air. To reduce to vacuum I have calculated the amounts of air displaced by both at normal pressure and temperature, by means of measurements. My results agree closely with the previous qualities determined by Prof. Miller in 1854. I find that Bronze pound displaces 1.156 grains of air. Platino-iridium pound "A" .400.

Hence, in vacuo (A — .4) = (Bronze — 1.156) + .6072 grains.

∴ A = Bronze — 1.156 + .6072 + .4

= Bronze — 1.156 + 1.0072

= Bronze — .1488 grains

or in a vacuum Bronze weighs more than A by .1488 grains.

*In a vacuum*

Bronze = A + .1488 grains.

From previous determination by Prof. Miller

Bronze = 7000.11611 grains in vacuo.

and "A" = 699.97694 " "

∴ Bronze — "A" = .13917 grains.

Former determination :

Bronze — "A" = .13917 grains in vacuo.

Present determination :

Bronze — "A" = .1488 grains in vacuo.

Change = .00963 grains.

That is the bronze pound has no doubt become slightly oxidized in spite of the gilding to the extent of .00963 grains. This change is remarkably small, seeing that the pound has not been tested since 1854, and that it has had many opportunities of becoming tarnished.

In conclusion I may say that the standards appear to have preserved their original values with but slight changes, changes in fact so slight, that it would require a much more rigid investigation than I was able to make in order to discover their true significance.

The only thing I noticed, in the way of rusting was on the "Airy" bar; the mid line of the three which are engraved on the gold stud at one end was badly blotched with rust, and a few more years of similar rusting would entirely efface the line. What has caused it, it is difficult to say, as the lines are engraved on gold; however, I cleaned the stud thoroughly and imagine that the process of rusting has been arrested. The bar "C" was in excellent order, just as good probably as the day it was made. The surfaces of the gold stud in "B" were slightly dulled.

All of which is respectfully submitted.

W. J. LOUDON.















3 2044 106 511 280